

REMARKS

Claims 1-12 and 38-41 remain in the referenced application. Claims 1-12 and 38-41 stand rejected under 35 USC 102(b) as being anticipated by Hlavenka (U.S. Patent No. 5,556,259).

Responsive to the above-recited rejection, Applicant now presents herewith further arguments in support of the subject application.

In the previously submitted amendment, claims 1 and 38 were amended to recite that the plurality of ports inlet a fluid flow “substantially tangential and normal” to the passageway. Applicant further respectfully submitted Hlavenka did not disclose such a fluid flow.

Applicant respectfully now presents Figure 1 as a reference and to clarify terminology. Figure 1 contains a cylinder and an axis A-A, wherein the axis A-A is the cylindrical axis of the cylinder, as well as the centerpoint of any circular or normal cross-section of the cylinder. Plane B represents a section plane perpendicular to the axis of the cylinder. As the section plane is perpendicular to the axis of the cylinder, the intersection of the plane B and the cylinder is a circle. If we look at plane B and the circle lying within plane B, then we must recognize that all objects “normal” to the cylindrical axis must lie in a plane parallel to plane B at any given point on the cylindrical axis of the cylinder.

Webster’s Seventh New Collegiate Dictionary defines “tangential – of or relating to a tangent.” Webster’s further defines “tangent – so meeting a curve or surface that all points of intersection in an interval are coincident.” Any object tangential to the

cylindrical object must therefore touch the cylindrical object at one point on the cylindrical surface in the same fashion as line C-C.

Any line tangent and normal to the cylindrical surface must therein lie in a plane parallel to plane B at some point along the axis A-A similar to line E-E. As shown in Figure 1, line E-E is outside of the cylindrical surface. Any tangent line must begin outside of the cylindrical surface, for example lines C-C and E-E.

If the cylinder shown in Figure 1 is hollow to accommodate a fluid flow, the flow through the passage would follow the axis A-A and therefore be parallel to the axis A-A. Hlavenka discloses an inlet flow traveling through an inlet 65, through a plurality of openings 66, into a cylindrical fluid passage 62, and ultimately to a conical bore 94. As the flow moves through the inlet 65, it is moving along the axis of the fluid passage, and thus is substantially parallel to the axis of the cylindrical passage 62.

The openings 66 that inlet fluid to the cylindrical passage 62 reside completely on an end of the cylindrical fluid passage 62. Further, all portions of the openings 66 are within the perimeter of the cylindrical surface. The inlets 65 appear to be tangential to cylindrical passage 62, however, they do not breach the wall of the cylindrical passage 62. As such, fluid is forced to flow axially through the inlets 65, not tangentially. Consequently, the fluid flow entering the cylindrical fluid passage 62 is not from a tangential inlet port. Hlavenka has created irregularly shaped openings at the end of the cylindrical passage 62 such that they generate a circular flow in the cylindrical fluid passage 62. While Hlavenka has used the terminology "tangential" in the disclosure, it's use is improper.

The Examiner has cited that Hlavenka's "plurality of openings (66) are tangential and therefore normal to his cylindrical bore and fluid passageway (62, 108)." Clearly, this cannot be the case, as a tangential and normal inlet must breach the cylinder wall to follow the path of line E-E as shown in Figure 1. A tangential and normal inlet port would follow line E-E up until it hits the tangent point. As we are discussing fluid inlets, it should be obvious to one skilled in the art that the fluid and the inlet ports would be required to breach the cylindrical surface and enter the cylindrical passage 62. A tangential and normal inlet is desirable to inlet fluid with a strong directional component, therein maximizing the induced rotation of the fluid. Hlavenka's flow clearly is predominantly parallel to the axis.

Hlavenka, in lines 1-3 of col. 3 recites, "Each opening is in fluid communication with the cylindrical bore 62 and extends generally tangentially to the cylindrical bore 62." However, the fluid flow into the cylindrical passage 62 cannot be considered tangential to the cylindrical passage 62 as it enters from an end of the cylindrical passage 62, not through the outer perimeter. Hlavenka's tangential inlets do not breach the wall of the cylindrical passage 62, and therefore cannot be tangential and normal. Hlavenka's flow in the cylindrical passage 62 is generally parallel with a rotational vector component that is induced by the irregularly shaped openings 66 in the end of the cylindrical passage 62. Tangential inlets would certainly breach the cylindrical face of the cylindrical passage 62.

In col. 4, lines 56-59, Hlavenka recites, "The tangential openings 66 cause the second fluid to swirl or rotate about the longitudinal axis 54 as it flows through the fluid passage 108 to the outlet port 102." The imbalanced shape of the openings 66 may provide a rotational component, but the openings are not tangential, as all fluid is entering

through the end of the cylindrical passage 62. Further, the inlet flow into the cylindrical passage 62 cannot be considered substantially normal to the cylindrical passage 62, because it enters through the openings 66 which are located at an end of the passage 62. Hlavenka, therefore, does not disclose tangential and normal inlet flow.

As previously stated, a tangential and normal inlet provides a maximum force component for the fluid entering through the inlet. As such, maximum rotation is achievable. Hlavenka can only achieve a partial component of the tangential and normal fluid vector component, because the fluid is entering from an end face of the cylindrical passage 62. Hlavenka's rotational component may only be a subcomponent of the velocity vector of the fluid flowing through the inlets 65. Therefore, Hlavenka's fluid flow is predominantly parallel to the axis of the cylindrical passage 62.

The prior art made of record has been reviewed by Applicant and is deemed not to anticipate nor render obvious the claimed invention.

In view of the foregoing, Applicant respectfully requests reconsideration of the rejected claims and earnestly solicits early allowance of the application.

Respectfully submitted,

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